

**Research Article**

**Professional examination stress induced hemodynamic changes in first year MBBS students**

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**Abstract**

**Background:** In recent years there has been a rising optimistic reception on the stresses involved in professional examination as this may affect student's wellbeing, learning and academic performance. Competitiveness in today's world has made stress inevitable in life. Medical students face stress in all stages of their academic career, including pre-clinical, paraclinical, and clinical years. The students of first M.B.B.S. probably face a major stress especially during the first credit examination.

**Materials and Methods:** Study was carried out among first year MBBS students of Sri Muthukumaran Medical College during November 2012. First year MBBS students were randomly selected and first part of study captured personal data. The rest comprised anthropometric measurements [ht(cms) , wt(kgs)] and pulse rate and blood pressure recordings ten days before, on the day (one hour before the examination) and ten days after first credit examination. Statistical analysis was done using SPSS software version 2.0. Student's t- test was used to compare the data and p value < 0.05 was considered significant.

**Result:** The overall response rate was 72% (108 out of 150 students). It was observed that 29 males (60 %) and 32 (53%) females students were having increase in pulse rate and systolic blood pressure one hour before the examination compared to pulse rate (PR) and systolic blood pressure (SBP) ten days before and ten days after the examination. Diastolic blood pressure (DBP) was also increased one hour before the examination compared to ten days before examination, though the difference was not statistically significant.

**Conclusion:** It is evident that the first year MBBS students undergo stress during their academic examinations and need of the hour is to use interventions like social and psychological to improve the quality of life. Student advisors and counsellors can train students about stress management.

**Keywords:** First year MBBS students, First credit examination, Examination stress, Pulse rate, Blood pressure

**1. Introduction**

Stress is inescapable in today's world. The undergraduate and post graduate medical schooling period is a nerve-racking period. In the recent days, due to rising competitiveness and ambition for achievement, the pressure on the students has increased to great extent.

Human body respond to stress by alterations in different biological functions particularly autonomic function like increase in heart rate and blood pressure<sup>1</sup>. There are many possible stressors to which medical students may be exposed like pressure of a meticulous academic curriculum coupled with recurrent examination and other sources of stress include personal factors such as staying away from family, tuning to unfavorable hostel conditions, parental expectations.

Academic examination stresses are the most common cause for occurrence of autonomic, cardiovascular, and immune system pathology among the college students which leads to mental and physical illness such as increasing nervousness, increasing depressing mood, menstrual disturbances and mood fluctuations in female students<sup>2</sup>.

Malathi *et al* and Al-Dabal *et al* stated that the students of first year M.B.B.S most likely face a major stress especially during the 1<sup>st</sup> term credit examination.<sup>3,4</sup>

This study was undertaken to observe the influence of exam stress on autonomic functions like pulse rate and blood pressure in the first M.B.B.S. students.

## 2. Materials and Methods

This is a prospective observational study carried out among first year MBBS students at Sri Muthukumaran Medical college Hospital and Research Institute, Chikkarayapuram, Chennai (TN), India. The population for this study comprised of undergraduate (MBBS) first year Medical students. Out of 150 first year MBBS students 113 students participated in the study. Those who refused for consent and students suffering from any acute or chronic physical illness were excluded from the study. Out of 113 students, 5 students were excluded from the study as they were absent during the credit examination.

Permission was taken beforehand from the teacher concerned on the day of the study and the last 25 min of a 1-hr lecture class was utilized for conducting the survey. Consent was obtained from the students prior to the study. After explaining the need of the study the students completed a self-administered questionnaire (gender, stay at hostel, mode of travel, time spent in travel every day, medium of study in school, place of school education) and were subjected to test the anthropometric measurements (height in cms and weight in kgs). BMI was calculated for all the students.

Hemodynamic parameters like Pulse Rate (Beats per minute), and Blood Pressure (mmHg) were recorded after 10 min of rest in sitting position<sup>5</sup> between 11.00 am to 12.30 pm ten days prior to 1<sup>st</sup> credit examination. The subjects were asked to avoid any stimulants like coffee 30 min before the measurements. All the parameters (ht, wt, PR, BP) were repeated one hour prior to 1<sup>st</sup> credit examination and ten days after examination.

Pulse rate was determined once by palpating the radial artery for 1 min.

BP was measured 3 times by auscultatory method using mercury sphygmomanometer with a gap of 1 min between the readings and the average of 3 readings was taken<sup>5</sup>. Pre readings (ten days before examination) for pulse rate, systolic blood pressure and diastolic blood pressure were compared with post readings (at the time of examination).

### 2.1 Statistical analysis

The data was entered into the computer catalogue. The response frequencies were calculated and analysed by using statistical software SPSS software version 2.0. Prevalence of a product variable along with 95% confidence interval was calculated. Student's t- test for paired samples was used to compare the mean values of study variable vital parameters in relation to examination stress. The descriptive statistics like mean and standard deviation was calculated. The probability value  $P < 0.05$  was considered as significant,  $P < 0.01$  and  $P < 0.001$  were considered as highly significant.

## 3. Results

The overall response rate was 72% (108 out of 150 students). Forty eight students were male (44.45%) and sixty were females (55.55%).

**Table No. 1: Mean and SD values for Age, Height and Weight of 1st MBBS both male and female students (n=108)**

Parameters	Mean	SD
Age (Yrs)	17.60	1.48
Height (Cms)	152.70	9.67
Weight (Kgs)	57.73	5.35

**Table No. 2: Comparison of Pulse Rate, Systolic and Diastolic Blood Pressure in I MBBS students ten days before and on the day (one hour before) of examination (All values are mean± SD)**

Parameters	Before examination (n=108)	One hour before examination (n=108)	t value
Pulse rate(BPM)	83.7±8.9	97.9±12.9***	12.2
Systolic blood pressure (mmHg)	108.9±10.1	120.6±10.9***	16.3
Diastolic blood pressure (mmHg)	68.2±7.5	72.1±12.2	1.3

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001 on comparing 10 days before exam and one hour before the onset of exam

Table no 2 shows increase in Pulse rate, Systolic blood pressure and Diastolic blood pressure one hour before to examination compared to ten days before examination

**Table No. 3: Comparison of Pulse Rate, Systolic and Diastolic Blood Pressure in I MBBS students on the day (one hour before) of examination and ten days after examination (All values are mean± SD)**

Parameters	One hour before examination (n=108)	After examination (n=108)	t value
Pulse rate(BPM)	97.9±12.9***	77.2±9.2	17.02
Systolic blood pressure (mmHg)	120.6±10.9***	104.3±8.9	14.76
Diastolic blood pressure (mmHg)	72.1±12.2	70.6±8.8	2.70

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001 on comparing one hour before the onset of exam and ten days after the exam

Table no 3 shows statistically significant increase in Pulse rate, Systolic blood pressure and Diastolic blood pressure one hour before to examination compared to ten days after the examination. Increase in Diastolic blood pressure, but it is not statistically significant.

#### 4. Discussion

Stress system is tonically lively in every individual. Any corporeal and mental stressors that surpass a significant threshold can amplify activity of stress system further. The hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic and adrenomedullary systems are the peripheral limbs of the stress system. In consequence, stress results in prolonged stimulation of sympathetic activity and cortisol secretion.

Medical education renders significant amount of stress to the students<sup>6,7</sup>. Many aspects of college life have the potential to cause stress, including adjusting to a new environment, fulfilling academic requirements, financial pressures, developing friendships, coping up the syllabus. Examination anxiety is one of the fundamental problems that students face which cause negative effect on their academic performance. Anxiety due to academic examinations has often been used in stress research because they are predictable, standardized and discrete examples of real-life stress that induce a significant neurohormonal change.

In this study we found that students undergoing the natural stress of academic examinations exhibited statistically distinct differences in radial artery pulse rate levels, systolic blood pressure levels. Increase in PR, SBP one hour prior to exam occurs possibly as a result of sympathetic activation. This is consistent with the findings of Freychuss *et al* & Malathi *et al* who contributed it to increased epinephrine levels<sup>1,3</sup>.

Epinephrine secretion is increased in presence of stressor like exam where the outcome is unpredictable. This sympathoadrenal response to stressful situation occurs in various forms including raised PR & BP<sup>8,9,10</sup>. Other researchers also reported a similar trend of increasing pulse rate, blood pressure, and galvanic skin resistance during examination stress.<sup>1,12</sup>

Our study also observed that 29(60.4 %) male and 47 (78.3%) female students were having increase in pulse rate and systolic blood pressure one hour before the examination compared to pulse rate(PR) and systolic blood pressure(SBP) ten days before and ten days after the examination. Bazmi Inam<sup>13</sup> has noted prevalence of increase anxiety in females to be 89.7% and males 60% in 1st year medical students of Saudi Arabia. Similar findings were noted from other studies conducted at western medical school as well as other Asian and African medical schools using different screening tools.<sup>14,15,16</sup> While some studies have found little or no evidence of stress among medical students.<sup>17,18</sup>

## 5. Conclusion

It can be concluded with the help of results obtained that examination is a situational stress resulting in mental stress, reflected as disturbed homeostasis of the body such as change in pulse rate and blood pressure. This study has also found that majority of undergraduate students experience stress during their first credit examination. Both academic and emotional factors are responsible for this stress.

The medical students and teaching faculty should be made aware of the negative consequences of stress faced and an effective stress relaxation program as well as counselling services should be provided to such stressed students to enhance their academic performance. Government education system needs to develop good study evaluation techniques which cause less stress among students and teachers, and imply better support programmes for students struggling for their well being.

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